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REMARKS

The present communication is responsive to the Official Action mailed May 7, 2003. A petition for a three-month extension of the term for response to said Official Action, to and including November 7, 2003, is transmitted herewith.

In response to the requirement to update the status of the co-pending applications, the status of one application has been amended at paragraph 0026 of the specification to indicate the issued patent number. Also, the specification has been amended to correct typographical errors. The absence of any new matter in these corrections is believed apparent from the corrections themselves. It is noted that the paragraph numbers used in this amendment are the paragraph numbers in the originally-filed specification. The paragraph numbers in the published specification were changed.

The Examiner's indication that claims 12-17 are allowable over the prior art of record is noted with appreciation, as is the indication that claims 19 and 20 would be allowable if rewritten to independent form. Claims 19 and 20 have not been rewritten at the present time, because it is believed that the independent claim will ultimately be held allowable for the reasons addressed below.

Claims 1-3, 5-7, 9-11, 18, 21 and 23 were rejected under 35 U.S.C. § 102(b) as anticipated by *Kozuka et al.*, U.S. Patent 6,055,859 ("*Kozuka*").

The Examiner's detailed explanation of the way in which *Kozuka* is applied is appreciated. However, it is not clear from this explanation whether the rejection is based on the premise that the transducer 16, in and of itself, constitutes the "resonant unit" recited in claim 1, or whether the rejection is based on the contrary proposition that the "resonant unit" includes the transducer 16 together with the

reflector 18 and the liquid disposed between these elements. At page 2 of the Official Action, the resonant unit is characterized as having a front surface 32 and a rear surface 36 (see Fig. 2A), which leads to the necessary conclusion that the reflector 18 lies outside of the resonant unit and is not a part thereof. However, page 3 of the Official Action refers to the resonant unit including the "liquid (reflector 18 disposed in the tank 14 filled with a liquid medium 12 . . .)" and characterizes those elements as being disposed "to the rear of said active element." It is respectfully submitted that it cannot be both ways; if surface 32 constitutes the front surface of the resonant unit, and surface 36 constitutes the rear surface, then the liquid in the tank and reflector 18 clearly are disposed outside of the resonant unit and are not parts thereof.

It is also respectfully submitted that neither construction of the reference would meet the claim. If element 16 alone is taken as the resonant unit of an ultrasonic emitter, it does not meet claim 1 for the simple reason that such unit does not include a liquid at all. Instead, the unit 16 is a conventional ultrasonic emitter immersed in a liquid. That would not meet the recitation in claim 1 that the resonant unit itself includes a liquid. The term "resonant unit" is explicitly defined in the specification (§ 0033) as including the rear-most "backing interface" and the materials between that backing element and the front surface. A "backing interface" is, in turn, defined as an interface lying to the rear of the front surface, which reflects ultrasound forwardly in the resonant unit and substantially influences emissions from the front surface of the unit. Insofar as one can deduce from *Kozuka*, the *Kozuka* transducer 16 is a generally conventional piezoelectric transducer in which the backing interface lies at the juncture between the active element or transducer plate 30

and the electrode 36. There is simply no liquid constituting a part of the resonant unit.

On the other hand, if the larger assembly including the transducer 16, reflector 18 and the liquid disposed between these elements is taken as the resonant unit, the same would not meet the recitation of the resonant unit in claim 1; that larger assembly could not possibly meet claim 1, because the larger assembly is not "adapted to emit ultrasonic vibrations" at all. The claim language which requires that the resonant unit be "adapted to emit ultrasonic vibrations" must be understood according to the plain and unambiguous ordinary meaning of the word "emit," i.e., "to throw or give off or out" or to "send out: eject." (Webster's New Collegiate Dictionary (1979) (definition copy annexed hereto as "Attachment A").) Thus, the claim recitation of a resonant unit "adapted to emit ultrasonic vibrations" means that the unit as a whole must be capable of throwing off or ejecting ultrasonic vibrations from the unit, i.e., that the unit must be arranged to throw off ultrasonic vibrations into an environment exterior to the unit. No teaching in *Kozuka* has been cited as showing that the assemblage of elements including transducer 16, reflector 18 and liquid disposed between them in *Kozuka* emits ultrasonic vibrations to the exterior of the assemblage. Rather, these components are arranged to form a standing wave field inside the assembly, by reflecting the ultrasonic energy at reflector 18 back toward transducer 16. These standing waves within the liquid disposed between the reflector and transducer act to manipulate micro particles suspended in the liquid. See, e.g., *Kozuka* col. 8, lns. 12-23. The reference disclosure, as a whole, teaches using reflector 18 to confine the ultrasonic energy within the space between the reflector and the transducer. Nothing has been pointed out in the reference as teaching or suggesting that ultrasonic vibrations should be or would be emitted from the

incorporating transducer 16, reflector 18 and the liquid disposed therebetween into some part or space outside of that unit. For that reason, the larger assembly could not meet the recitation of a "resonant unit adapted to emit ultrasonic vibrations." Moreover, the larger assembly including the transducer reflector and liquid therebetween, as a whole, does not constitute an "ultrasonic emitter" as referred to in the preamble of claim 1. The very phrase "ultrasonic emitter" necessarily requires that the device be capable of sending ultrasonic vibrations out to the environment outside of the device itself.

For all of the above reasons, the § 102 rejection of claim 1 should be withdrawn.

Claim 2 has been amended to further clarify the directions referred to in the claim and to specify explicitly that the "resonant unit" is "adapted to emit ultrasonic vibrations in said forward direction, i.e., in the direction in which the front surface faces. It is noted that this does not narrow the claim, inasmuch as this limitation was already implicit in the recitation of a backing interface, which acts to reflect ultrasonic vibrations forwardly. The construction of *Kozuka* advanced in the Official Action explicitly relies on reflector 18 as part of the "rear structure" which defines "a space disposed to the rear of the active element," as recited in claim 2. (Official Action, sentence extending from p. 3 to p. 4.) However, in the reference, this space and the alleged backing interface are not disposed to the rear of the transducer; they lie over the surface 32, which the Official Action alleges constitutes the front surface of the transducer. Thus, the reference cannot possibly meet the claim under a theory that the surface at electrode 32 constitutes the front surface of the active element, and reflector 18 constitutes a portion of the rear structure or backing interface. Under this

theory, the reflector and interface are in the wrong place to meet the claim.

The reference would equally fail to meet claim 2 if one were to construe the opposite surface (at electrode 36) as the "front surface" of the active element. There is no suggestion that the assemblage of the transducer 16 and reflector 18 is arranged to emit ultrasonic vibrations through this surface, i.e., through the downwardly-facing surface of the transducer, as seen in Fig. 1. As pointed out above, the entire function of the reference structure is to create standing waves in the space between surface 30 of the transducer and reflector 18, and not to emit ultrasonic vibrations at all to any space outside of the assembly. Further, as pointed out by the Examiner (Official Action at 4; *Kozuka* col. 9, lns. 62-63), the transducer is attached by silicone rubber to a mounting bracket (not shown in the drawing). There is no suggestion in the reference that the structure functions to emit ultrasound through the surface at electrode 36 into the silicone rubber mounting. Thus, even if one were to construe the rearward direction as the upward direction in *Kozuka* Fig. 1, and the forward direction as the downward direction in the same drawing (as would be necessary to place the alleged rear structure to the rear of the active element, as required by the claim), the reference still does not meet the recitations of claim 2.

The rejection of claim 2 must be withdrawn. The rejection of claim 3 must be withdrawn for the same reasons.

The rejections of claims 5 and 6 should be withdrawn for the same reasons as advanced above with respect to claims 2 and 3. The rejection of claims 7/2 and 7/3 should be withdrawn for the same reasons. Moreover, the rejection of claim 7/2 and 7/3 on *Kozuka* should be withdrawn for the additional reason that nothing in *Kozuka* has been pointed out as meeting the structural features set forth in this claim. Claim 7 requires that the

"rear structure" include "a wall having a front surface facing toward said space and a rear surface facing away from said space." "Said space" necessarily refers to the space containing a liquid (¶ (c) in each of claims 2 and 3, incorporated by dependency). Thus, the front surface of the "wall" recited in claim 7 necessarily must face toward the liquid-containing space. The wall also must have a "rear surface facing away from said space." Additionally, claim 7 requires "a medium having acoustic impedance lower than the acoustic impedance of said liquid, said medium abutting said rear surface of said wall." The claim, thus, requires a wall disposed between the liquid-containing space and the "medium." Merely by way of example, in the embodiment of present Fig. 4, the liquid is contained in space 1740. The front surface of wall 1714 (the surface facing upwardly in Fig. 4) faces toward this space, whereas the rear surface (at reference numeral 1713) faces away from space 1740. A medium (a gas in a further space 1726) abuts the rear or downwardly-facing surface 1713 of wall 1714. As noted in the specification, the interface defined by this wall and the low acoustic impedance medium (the gas) help to provide a highly-reflective interface. Nothing in the reference relied upon for rejection has been pointed out as meeting these recitations of the claim. In particular, even if reflector 18 of the reference could be regarded as a wall included in a rear structure, and even if the space between reflector 18 and transducer 16 could be regarded as the "space" referred to in claim 7 (*i.e.*, the space containing a liquid), the opposite surface of reflector 18 (the surface facing upwardly in Fig. 1) is not in abutment with "a medium having acoustic impedance lower than the acoustic impedance of said liquid." As depicted in the reference, the upwardly-facing surface of reflector 18 is entirely immersed in the same liquid as is present in the space between the reflector 18 and the transducer 16.

The rejections of claims 9-11 under § 102 should be withdrawn for the same reasons advanced above with respect to claims 2 and 3. Further, the § 102 rejection of claim 11 is not understood, inasmuch as nothing in *Kozuka* has been advanced as teaching the "generally tubular" active element, as recited in this claim.

By the present amendment, claim 18 has been amended to clarify its language, but without changing the scope of the claim. The § 102 rejection of claim 18 should be withdrawn for reasons similar to those advanced above with respect to claims 1-3. In particular, even if one were to regard the liquid contained in the space above transducer 16 as the liquid "disposed to the rear of said active element" and as a part of a "resonant unit," the "unit" including the reflector 18, liquid and transducer 16 have not been shown emit any ultrasonic vibrations outside of the "unit," as required by the positive method recitation of "said resonant unit emitting ultrasonic vibrations." Moreover, there is no showing that the alleged unit including the reflector 18, liquid and transducer 16 sends ultrasonic vibrations out from the unit "principally in said forward direction." If one were to construe the liquid above the unit as the liquid "disposed to the rear of said active element," the only "forward direction" in the reference would be downwardly, through the electrode 36. The reference simply does not suggest that the unit sends ultrasonic vibrations in this direction. The rejection of claims 21 and 23 should be withdrawn for substantially the same reasons.

Independent method claim 24 recites that the operations are performed so that ultrasonic vibrations propagated from the rear surface of the active element pass through the liquid and back to the reflective interface, are reflected at the interface, and pass back through the liquid to the active element. The claim also recites specifically that

the reflective interface is arranged to direct the ultrasonic vibrations "out of the element substantially through said front surface," i.e., through the front surface of the active element. Given the remaining language of the claim, the front surface of the active element is, necessarily, the surface of the active element facing away from the reflective interface. Assuming for the purposes of argument that the interface at reflector 18 could be considered as a reflective interface, nothing in the reference suggests even remotely that the reflective interface backs the active element so that ultrasonic vibrations are directed out of the element "substantially through said front surface," i.e., through the surface of transducer 16, facing downwardly away from reflector 18.

Claims 4, 8 and 22 were rejected under 35 U.S.C. § 103(a) on *Kozuka* in view of *Axelsson*, U.S. Patent 6,282,949 ("*Axelsson*"). Reconsideration of this rejection is respectfully requested. Claims 4 and 8 distinguish over the combined references for the same reasons as discussed above in connection with claims 2 and 3. Nothing in *Axelsson* has been pointed out as remedying the fundamental deficiencies of *Kozuka* discussed above. Further, as to claim 8, *Axelsson* seeks to detect gas bubbles (see, e.g., the abstract) by directing ultrasound from an emitting transducer 3 to a receiving transducer 4 and measuring the intensity of the received ultrasound. *Axelsson* does not propose to provide a gas within an ultrasonic emitter. Moreover, the reasons stated in the Official Action which would supposedly motivate one of ordinary skill to "utilize in *Kozuka* the techniques of *Axelsson*" are not understood. As pointed out above, *Kozuka* seeks to manipulate microscopic particles suspended in a liquid by creation of a standing ultrasonic wave pattern. The fact that a "great and reliable difference between the respective sound intensities" is

achieved in Axelsson's bubble detector has no discernable relevance to Kozuka's system.

Claim 22 distinguishes over the combined references for the same reasons as claim 18. Moreover, the only gas in Axelsson is a gas bubble which may be detected in a medium streaming between the emitter and the receiver. Axelsson does not suggest using a gas and liquid arranged so that the gas forms part of a "reflective backing interface," i.e., an interface of an emitter which directs sound out through the front of the emitter as required by claim 22, nor does this reference suggest an interface formed by a liquid "disposed between said gas and said rear surface of said active element."

As it is believed that all of the objections and rejections set forth in the Official Action have been fully met, favorable reconsideration and allowance of the presently pending claims are earnestly solicited.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

Dated: November 7, 2003

Respectfully submitted,

By 

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